

Estimating soil loss rate and sediment yield of the proposed Ngoloweni earth dam,

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Soil loss and sediments yield affect most of our reservoirs globally. Sediments deposited in water bodies, especially reservoirs can reduce reservoir useful life through loss of storage. Research has found that large reservoirs can lose between 0.5%-1% of their annual storage. While smaller reservoirs on average lose 2.6% as a result of sedimentation. The main objective of the study was to estimate soil loss and sediment yield of the proposed earth dam in Mntjuzalala catchment, Eswatini. This would assist in development soil loss and sediment yield management measures in the catchment. The study employed the Reversed Universal Soil Loss Equation (RUSLE) runoff plots and satellite images for the analysis. Using ArcGIS, land-use/land-cover (LULC) results indicated that there was a significant change between 1988-2018. Grassland cover was observed to have decreased from 39.8% to 18.5% while bushland increased from 13.3% to 37.1%. However, the bushland is not valuable since it is classified as invasive alien plants. Cultivation also experienced increase in recent years, from 3.2% to 21%. This was due to increase in settlements from 11.5% to 19.7% which resulted into increased human activities thus reducing wetland from 32% to 4.5% in between the study period. From estimated soil loss, it was observed that annual average sediment yield was 82.04 tonnes/year and sediment delivery ratio (SDR) was 0.46, thus sediment deposit on reservoir site was 30.19 tonnes/year. The sedimentation rate/annual storage loss was estimated at 1.55% per annum, which would lead to 50% of the reservoir storage having been lost after 32 years when the annual sediment deposition is 1946.75m^3 . In terms of sediments sources, it was observed that this earth dam site is adjacent to gullies and cattle tracks which are active sources of sediments during rainy season. From the soil erosion and sedimentation outcomes, there is need to implement sustainable land and water management measures in the catchment. This should include activities on soil conservation and sediment retention structures; development and implementation of chiefdom development plan as well as improved institutional arrangements.